rney Docket No.: 17795 [TYCO-6]

What is claimed is:

1 A substrate for an area array package,

said substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate,

said substrate having a ground structure including, for each signal wiring, a pair of rectangular ground plane portions located on opposite sides of the second contact of that signal wiring, and

said substrate having a plurality of ground via holes through the substrate, including at least one respective ground via hole through each rectangular ground plane portion.

- 2. The substrate according to claim 1, wherein each ground plane portion has a 2 plurality of ground via holes therethrough.
- The substrate according to claim 1, wherein for each second contact, the 1 3. respective ground plane portions are connected by a third ground plane portion on a third 2 3 side of the second contact.
- 1 The substrate according to claim 3, wherein the third ground plane portion has a 4. 2 plurality of ground via holes therethrough.
- 1 5. The substrate according to claim 3, wherein the third ground plane portions of 2 each second contact on at least a side of the substrate are continuously connected.
- The substrate according to claim 1, wherein each pair of adjacent ones of the 1 6. 2 second contacts have a single rectangular ground plane portion therebetween.
- 1 7. The substrate according to claim 1, wherein the substrate has an opening
- 2 therethrough sized and shaped to receive the integrated circuit.

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1	8.	An area array package comprising:
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a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate,

a ground structure including, for each signal wiring, a pair of rectangular ground plane portions located on opposite sides of the second contact of that signal wiring, and

a plurality of ground vias through the substrate, including at least one respective ground via hole through each rectangular ground plane portion;

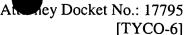
a cover above the substrate, and

a bottom layer of the package formed of a dielectric material.

- 9. The package of claim 8, further comprising an intermediate dielectric layer between the bottom layer and the substrate, the intermediate dielectric layer having an additional ground structure thereon.
- 1 10. The package of claim 9, further comprising a third ground structure between the 2 bottom layer and the intermediate layer.
- 1 11. The package of claim 9, wherein the additional ground structure has a ground
- 2 opening around a signal via that is coupled to the second contact, the ground opening
- 3 being generally shaped like a rectangle with two mitered corners.
- The package of claim 8, wherein the package has a signal via beneath each second contact, and a ground via beneath each ground via hole, each of the signal vias and ground vias being electrically connected to a respective solder attach pad on the bottom layer.
 - 13. The package of claim 12, wherein each signal via is surrounded on three sides.

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1	14.	The package of cla	m 13, wherein each s	signal via is surround	ed by at least seven
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- 2 ground vias
- 1 15. The package of claim 8, further comprising a superstrate above the substrate, the
- 2 superstrate generally being formed of the same material as the substrate.
- 1 16. The package of claim 15, wherein the superstrate has an opening therethrough
- 2 above each second contact.
- 1 17. The package of claim 16, wherein the opening above each second contact is
- 2 cylindrical and is greater in diameter than the ground vias.
- 1 18. The package of claim 16, wherein the opening above each second contact is filled
- with a material having a sufficiently low dielectric constant to reduce the radiation from a
- 3 region of the second contact significantly.
 - 19. The package of claim 8, wherein the package includes a plurality of pockets, each pocket shaped and sized to accommodate an integrated circuit.
 - 20 A printed circuit board assembly, comprising:
- 2 a printed circuit board having a circuit board substrate with circuit traces and a
- 3 plurality of devices thereon, said plurality of devices including at least one integrated
- 4 circuit package assembly that includes:
- 5 a package substrate having:
- 6 a plurality of signal wirings, each having a first contact adapted to
- be connected to a respective terminal of an integrated circuit, and a second
- 8 contact on a periphery of the package substrate,
- 9 a ground structure including, for each signal wiring, a pair of
- rectangular ground plane portions located on opposite sides of the second
- 11 contact of that signal wiring, and

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12	a plurality of ground vias through the package substrate, includin
13	at least one respective ground via hole through each rectangular ground
14	plane portion;
15	a lid above the package substrate, and
16	a bottom layer of the package formed of a dielectric material, the bottom layer
17	having a plurality of solder attach pads, electrically connected to contacts of the circuit
18	board substrate.

1 21. An area array package comprising:

a substrate having a plurality of signal wirings, each having a first contact adapted to be connected to a respective terminal of an integrated circuit, and a second contact on a periphery of the substrate, the substrate having a signal via penetrating each second contact;

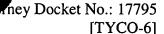
a superstrate formed of a dielectric material above the substrate, the superstrate having a respective opening therethrough above each second contact;

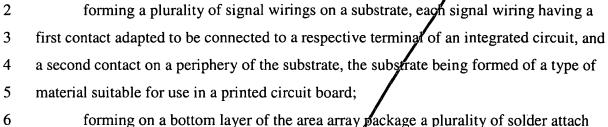
a lid above the superstrate; and

a bottom layer of the package formed of a dielectric material.

- 22. The package of claim 21, wherein the opening above each second contact is cylindrical and is greater in diameter than the ground vias.
- 1 23. The package of claim 21, wherein the superstrate is formed of the same material 2 as the substrate.
- 1 24. The package of claim 21, wherein the substrate has a plurality of ground vias
- 2 therethrough, at least partially surrounding each of the signal vias.
- 1 25 The package of claim 24, wherein the substrate has a plurality of rectangular
- 2 ground plane portions surrounding each of the signal vias on three sides, the ground vias
- 3 enetrating the ground plane portions.
- 1 A method for forming an area array package comprising the steps of:







forming on a bottom layer of the area array package a plurality of solder attack pads aligned with the plurality of second contacts;

forming a plurality of signal via holes penetrating the second contacts and solder attach pads and penetrating through the substrate and the bottom layer;

filling the signal via holes with a conductive liquid capable of solidifying; and solidifying the conductive liquid to form conductive signal vias.

- 1 27. The method of claim 26, further comprising plating the conductive vias.
- 1 28. The method of claim 26, further comprising 2 forming ground regions on the substrate;

forming on the bottom layer a plurality of ground solder attach pads aligned with the plurality of ground regions;

forming a plurality of ground via holes penetrating the ground regions and ground solder attach pads and penetrating through the substrate and the bottom layer;

filling the ground via holes with additional conductive liquid capable of solidifying; and

solidifying the additional conductive liquid to form conductive ground vias.

- 29. The method of claim 26, wherein:
- the substrate is formed of a material comprising PTFE with a ceramic filler, and the bottom layer is formed of a glass reinforced hydrocarbon/ceramic laminate.
- 1 30. The method of claim 29, further comprising attaching a superstrate above the
- 2 substrate, the superstrate generally being formed of the same material as the substrate.
- 1 31. The method of claim 29, further comprising attaching a lid above the substrate,
- 2 the hid being formed of FR4 or similar epoxy glass laminate.



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